

## **WHAT IS CLAIMED IS:**

1. Method for producing ion packages with a predetermined velocity using a system filled with damping gas consisting of coaxially arranged apertured diaphragms into which the ion beam is injected in line with the axis, and with consecutive phases of a low-frequency travelling field voltage applied to the diaphragms, wherein the low-frequency travelling field voltage consists of at least four consecutive phases and wherein a two-phase RF voltage is superimposed periodically on the phases of the travelling field voltage.
2. Method as in claim 1, wherein the travelling field voltage has a voltage of 5 to 200 volts and a frequency of 10 to 200 kHz.
3. Method as in claim 1, wherein the RF voltage has a voltage of 10 to 1000 volts and a frequency of 0.5 to 10 MHz.
4. Method as in claim 1, wherein the distances between the diaphragms in the apertured diaphragm system are small at the injection end and larger at the emission end.
5. Method as in claim 1, wherein the aperture diameter of the apertured diaphragm system is large at the injection end and smaller at the emission end.

6. Method as in claim 1, wherein the ion packages are injected into an ion-trap mass spectrometer.
7. Method as in claim 6, wherein the mass spectrometer is a quadrupole RF ion-trap mass spectrometer.
8. Method as in claim 7, wherein the time when the ion package is injected can be varied in relation to the RF phase of the ion-trap mass spectrometer.
9. Method as in claim 6, wherein the ion-trap mass spectrometer is an ion cyclotron resonance mass spectrometer.
10. Method as in claim 1, wherein the ion packages are injected into the pulser of a time-of-flight mass spectrometer with orthogonal ion injection.
11. Method as in claim 10, wherein the ion packages are post-accelerated before they are injected into the pulser.
12. Method as in claim 1, wherein the damping gas has a pressure of 0.01 to 100 Pascal.

13. Travelling field system consisting of coaxial apertured diaphragms with electrical connections and a voltage generator for providing sequential rotational phases of a travelling field voltage to the apertured diaphragms, wherein the voltage generator delivers an even number of at least four sequential rotational phases of a travelling field voltage, over which a two-phase RF voltage is superimposed alternately.

14. Travelling field system as in claim 13, wherein the travelling field voltage consists of four, six or eight phases.

15. Travelling field system as in claim 13, wherein the rotary phases of the travelling field voltage have equal angle of rotation spacings.